

# Specification For Color Series

## HPL-H28WX1BA

### Features

- Dimension : 2.8mm(L)×2.8mm(W)
- High Radiant Flux type
- All Metal Design Cu Substrate with Silicone Lens
- View Angle 140°
- The InGaN or AlInGaP Chip inside
- Low thermal resistance

### Applications

- Signal lighting
- Interior & exterior automotive lighting
- Decorating and entertainment lighting
- Grow lighting

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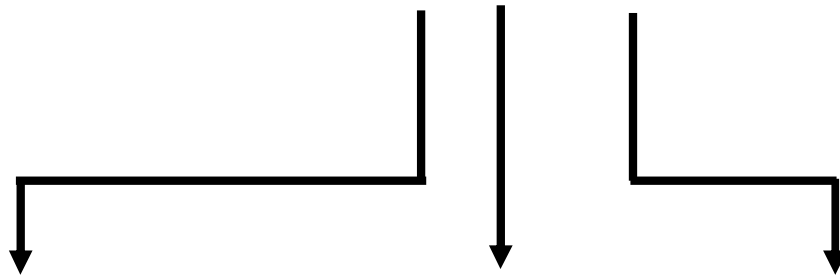
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## General Information

# HPL - H28WX1BA



### Lens & Assembly Type-

W : 140° Lens Emitter only

Z : 140° Lens Emitter on Standard Star

### X:Color-

R: Red

G: Green

B: Blue

A: Amber

O: Orange

D: Royal Blue

H: Deep Red

### Power-

B: 1W

## Part Number Matrix

| Type<br>Color | 140°Lens     | 140°Lens & Star |
|---------------|--------------|-----------------|
| Red           | HPL-H28WR1BA | HPL-H28ZR1BA    |
| Green         | HPL-H28WG1BA | HPL-H28ZG1BA    |
| Blue          | HPL-H28WB1BA | HPL-H28ZB1BA    |
| Amber         | HPL-H28WA1BA | HPL-H28ZA1BA    |
| Orange        | HPL-H28WO1BA | HPL-H28ZO1BA    |
| Royal Blue    | HPL-H28WD1BA | HPL-H28ZD1BA    |
| Deep Red      | HPL-H28WH1BA | HPL-H28ZH1BA    |

## Handling precaution



Do not poke the silicone encapsulant with sharp object



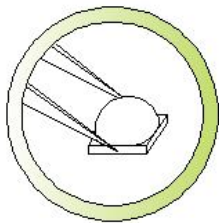
Do not stack assembled PCB



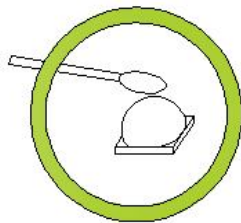
Do not hold the LED with hand



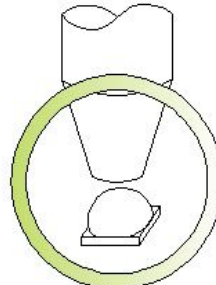
Do not touch and press the silicone encapsulant



Hold the LED only by the metal substrate



Clean the silicone surface with cotton bud with minimal pressure



Use pick and place nozzle per recommendation in datasheet

## Absolute Maximum Ratings

(T<sub>j</sub>=25°C)

| Parameter   | Symbol                | Rating              | Unit |
|---|-----------------------|---------------------|------|
| Power Dissipation   | P                     | 1.05                | W    |
|   |                       | 1.5                 |      |
|   |                       | 1.5                 |      |
|   |                       | 1.05                |      |
|   |                       | 1.05                |      |
|   |                       | 1.5                 |      |
|   |                       | 1.05                |      |
| Forward Current   | I <sub>F</sub>        | 350                 | mA   |
| Forward Pulse Current<br>(1/10 Duty Cycle, 400msec Pulse Width) | I <sub>FP</sub>       | 500                 | mA   |
| Thermal Resistance, Junction-Case                               | R <sub>th, J-C1</sub> | 5                   | °C/W |
| Reverse Voltage   | V <sub>R</sub>        | 5                   | V    |
| LED Junction Temperature  | T <sub>j</sub>        | 125                 | °C   |
| Operating Temperature Range                                     | T <sub>opr</sub>      | -40°C to + 80°C     |      |
| Storage Temperature Range                                       | T <sub>stg</sub>      | -40°C to + 120°C    |      |
| Soldering Condition   | T <sub>sol</sub>      | 260°C For 5 Seconds |      |

Note: 1. The thermal resistance value is measured with MCPCB (Star).

## Initial Electrical/Optical Characteristics

- **Forward Voltage**

(T<sub>j</sub>=25°C)

| Color        | Forward Voltage |      |      |      |                        |      |
|--------------|-----------------|------|------|------|------------------------|------|
|              | Symbol          | MIN. | TYP. | MAX. | Test Condition         | Unit |
| Red→R        | V <sub>F</sub>  | 1.83 | 2.3  | 3.03 | I <sub>F</sub> = 350mA | V    |
| Green→G      | V <sub>F</sub>  | 3.03 | 3.5  | 4.23 | I <sub>F</sub> = 350mA | V    |
| Blue→B       | V <sub>F</sub>  | 3.03 | 3.5  | 4.23 | I <sub>F</sub> = 350mA | V    |
| Amber→A      | V <sub>F</sub>  | 1.83 | 2.3  | 3.03 | I <sub>F</sub> = 350mA | V    |
| Orange→O     | V <sub>F</sub>  | 1.83 | 2.3  | 3.03 | I <sub>F</sub> = 350mA | V    |
| Royal Blue→D | V <sub>F</sub>  | 3.03 | 3.5  | 4.23 | I <sub>F</sub> = 350mA | V    |
| Deep Red→H   | V <sub>F</sub>  | 1.83 | 2.3  | 3.03 | I <sub>F</sub> = 350mA | V    |

- **Reverse Current**

(T<sub>j</sub>=25°C)

| Color        | Reverse Current |      |      |      |                     |      |
|--------------|-----------------|------|------|------|---------------------|------|
|              | Symbol          | MIN. | TYP. | MAX. | Test Condition      | Unit |
| Red→R        | I <sub>R</sub>  | -    | -    | 100  | V <sub>R</sub> = 5V | μA   |
| Green→G      | I <sub>R</sub>  | -    | -    | 100  | V <sub>R</sub> = 5V | μA   |
| Blue→B       | I <sub>R</sub>  | -    | -    | 100  | V <sub>R</sub> = 5V | μA   |
| Amber→A      | I <sub>R</sub>  | -    | -    | 100  | V <sub>R</sub> = 5V | μA   |
| Orange→O     | I <sub>R</sub>  | -    | -    | 100  | V <sub>R</sub> = 5V | μA   |
| Royal Blue→D | I <sub>R</sub>  | -    | -    | 100  | V <sub>R</sub> = 5V | μA   |
| Deep Red→H   | I <sub>R</sub>  | -    | -    | 100  | V <sub>R</sub> = 5V | μA   |

● **Luminous Flux or Radiant Flux**

(T<sub>j</sub>=25°C)

| Color        | Luminous Flux / Radiant Flux |      |      |      |                        |      |
|--------------|------------------------------|------|------|------|------------------------|------|
|              | Symbol                       | MIN. | TYP. | MAX. | Test Condition         | Unit |
| Red→R        | Φ <sub>v</sub>               | -    | 50   | -    | I <sub>F</sub> = 350mA | lm   |
| Green→G      | Φ <sub>v</sub>               | -    | 80   | -    | I <sub>F</sub> = 350mA | lm   |
| Blue→B       | Φ <sub>v</sub>               | -    | 18   | -    | I <sub>F</sub> = 350mA | lm   |
| Amber→A      | Φ <sub>v</sub>               | -    | 40   | -    | I <sub>F</sub> = 350mA | lm   |
| Orange→O     | Φ <sub>v</sub>               | -    | 60   | -    | I <sub>F</sub> = 350mA | lm   |
| Royal Blue→D | Φ <sub>e</sub>               | -    | 400  | -    | I <sub>F</sub> = 350mA | mW   |
| Deep Red→H   | Φ <sub>e</sub>               | -    | 300  | -    | I <sub>F</sub> = 350mA | mW   |

● **Dominate Wavelength or Peak Wavelength**

(T<sub>j</sub>=25°C)

| Color        | Dominate Wavelength or Peak Wavelength |      |      |      |                        |      |
|--------------|--|------|------|------|------------------------|------|
|              | Symbol                                 | MIN. | TYP. | MAX. | Test Condition         | Unit |
| Red→R        | λ <sub>d</sub>                         | 620  | -    | 630  | I <sub>F</sub> = 350mA | nm   |
| Green→G      | λ <sub>d</sub>                         | 520  | -    | 535  | I <sub>F</sub> = 350mA | nm   |
| Blue→B       | λ <sub>d</sub>                         | 460  | -    | 475  | I <sub>F</sub> = 350mA | nm   |
| Amber→A      | λ <sub>d</sub>                         | 585  | -    | 595  | I <sub>F</sub> = 350mA | nm   |
| Orange→O     | λ <sub>d</sub>                         | 610  | -    | 620  | I <sub>F</sub> = 350mA | nm   |
| Royal Blue→D | λ <sub>p</sub>                         | 440  | -    | 460  | I <sub>F</sub> = 350mA | nm   |
| Deep Red→H   | λ <sub>p</sub>                         | 650  | -    | 670  | I <sub>F</sub> = 350mA | nm   |

Note: Royal Blue and Deep Red LEDs are binned by Radiant Flux and Peak Wavelength.

- **Typical Radiation Pattern**

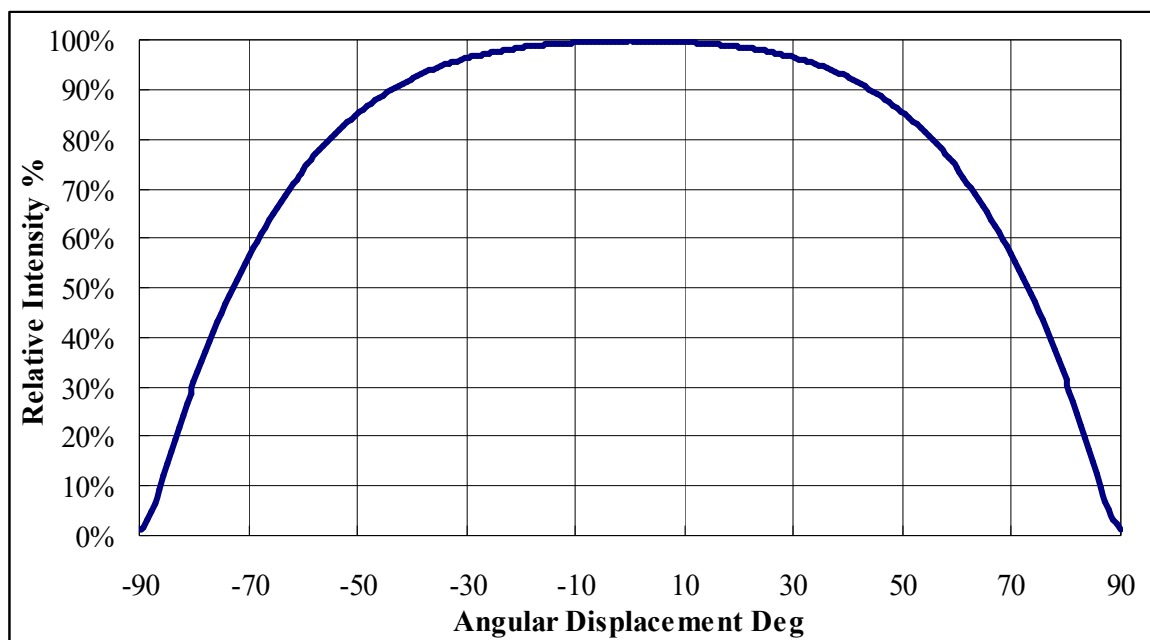


Fig. (140° Lens) Typical Representative Spatial Radiation Pattern



● Bin Code List for Reference

(T<sub>j</sub>=25°C)

| Item                         | Bin Code | Symbol         | Condition                 | Min. | Max. | Unit |
|------------------------------|----------|----------------|---------------------------|------|------|------|
| Forward Voltage <sup>1</sup> | C        | V <sub>F</sub> | I <sub>F</sub> = 350 [mA] | 1.83 | 2.07 | V    |
|                              | D        |                |                           | 2.07 | 2.31 |      |
|                              | E        |                |                           | 2.31 | 2.55 |      |
|                              | F        |                |                           | 2.55 | 2.79 |      |
|                              | G        |                |                           | 2.79 | 3.03 |      |
|                              | H        |                |                           | 3.03 | 3.27 |      |
|                              | J        |                |                           | 3.27 | 3.51 |      |
|                              | K        |                |                           | 3.51 | 3.75 |      |
|                              | L        |                |                           | 3.75 | 3.99 |      |
|                              | M        |                |                           | 3.99 | 4.23 |      |
| Luminous Flux <sup>2</sup>   | B        | Φ <sub>v</sub> | I <sub>F</sub> = 350 [mA] | 10.7 | 13.9 | lm   |
|                              | C        |                |                           | 13.9 | 18.1 |      |
|                              | D        |                |                           | 18.1 | 23.5 |      |
|                              | E        |                |                           | 23.5 | 30   |      |
|                              | F        |                |                           | 30   | 40   |      |
|                              | G        |                |                           | 40   | 50   |      |
|                              | H        |                |                           | 50   | 60   |      |
|                              | J        |                |                           | 60   | 70   |      |
|                              | K        |                |                           | 70   | 80   |      |
|                              | L        |                |                           | 80   | 90   |      |
|                              | M        |                |                           | 90   | 100  |      |
|                              | N        |                |                           | 100  | 120  |      |
| Radiant Flux <sup>2</sup>    | A        | Φ <sub>e</sub> | I <sub>F</sub> = 350 [mA] | 175  | 225  | mW   |
|                              | B        |                |                           | 225  | 275  |      |
|                              | C        |                |                           | 275  | 350  |      |
|                              | D        |                |                           | 350  | 425  |      |
|                              | E        |                |                           | 425  | 500  |      |

Note: 1. Forward voltage measurement allowance is ± 0.1V.

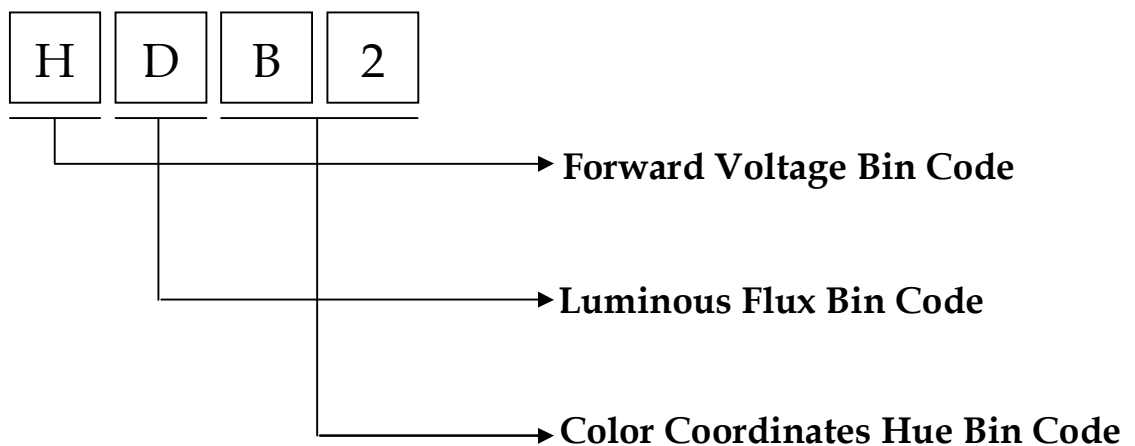
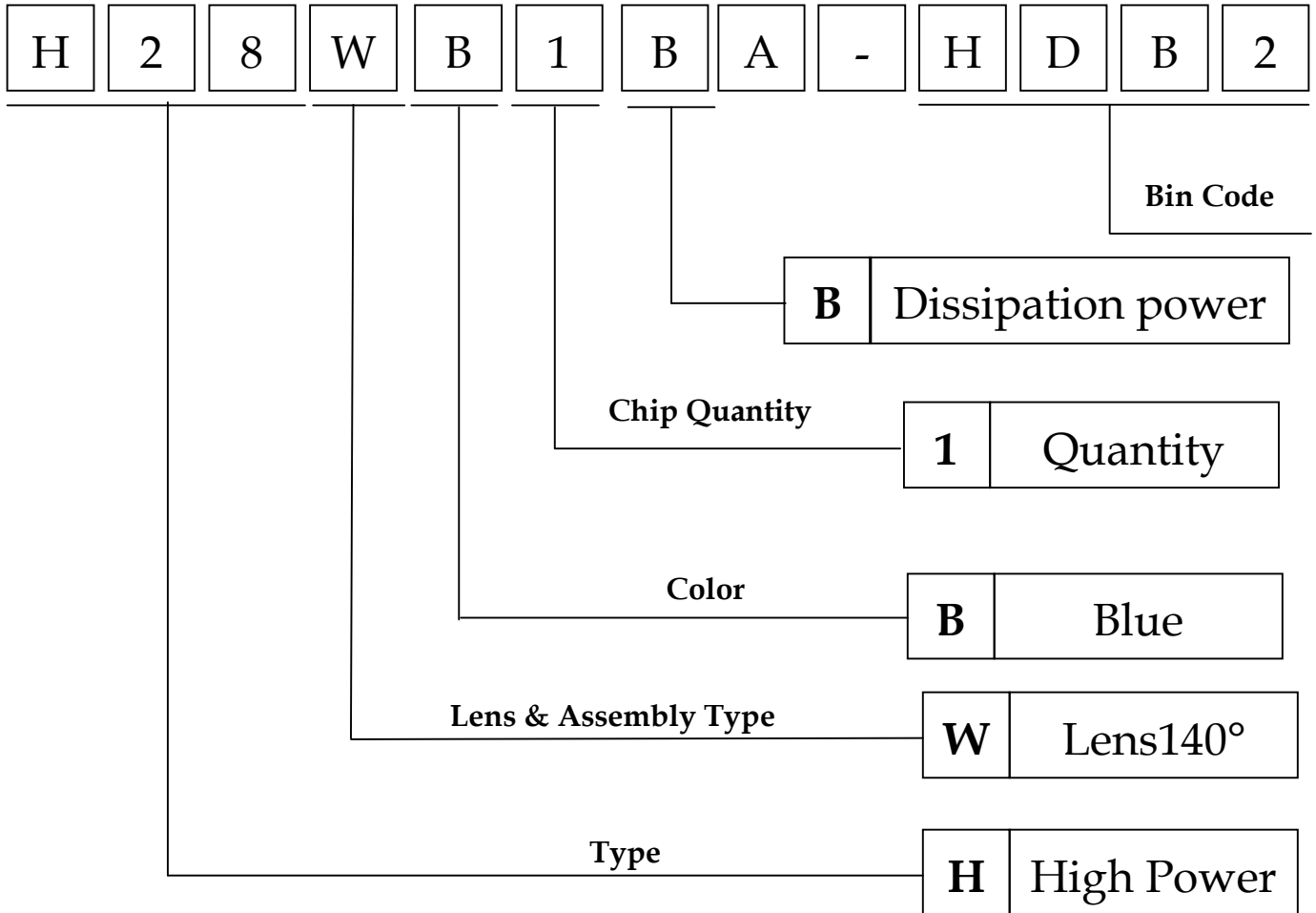
2. Luminous flux and Radiant Flux measurement allowance is ± 10%.

- Hue Bin Code List for Reference**

| Name         | Code | $\lambda$ Min (nm) | $\lambda$ Max (nm) |
|--------------|------|--------------------|--------------------|
| Blue         | B1   | 460                | 465                |
|              | B2   | 465                | 470                |
|              | B3   | 470                | 475                |
| Green        | G2   | 520                | 525                |
|              | G3   | 525                | 530                |
|              | G4   | 530                | 535                |
| Amber        | A2   | 587                | 589.5              |
|              | A4   | 589.5              | 592                |
|              | A6   | 592                | 594.5              |
| Red & Orange | R2   | 610                | 615                |
|              | R3   | 615                | 620                |
|              | R4   | 620                | 625                |
|              | R5   | 625                | 630                |
| Royal Blue   | D0   | 440                | 445                |
|              | D1   | 445                | 450                |
|              | D2   | 450                | 455                |

Note: Wavelength measurement allowance is  $\pm 2$ nm

## Part Number Formation



## Characteristic Diagram

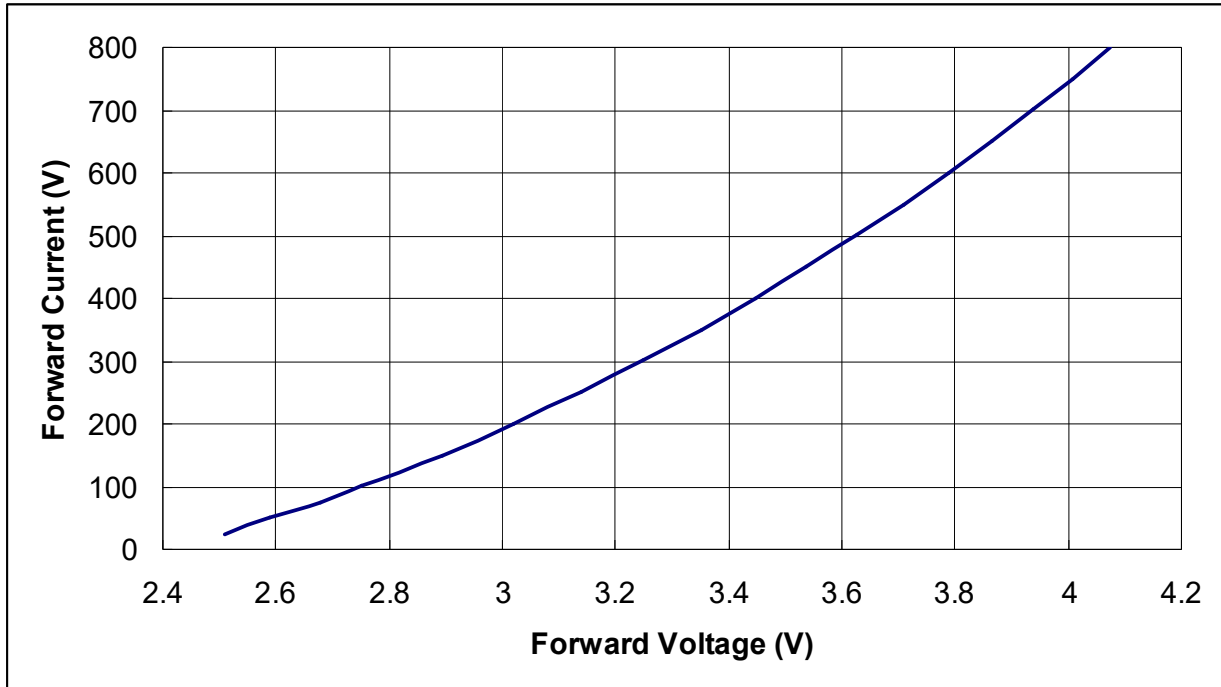


Fig. Forward Current vs. Forward Voltage: Blue/Green/Royal Blue color.

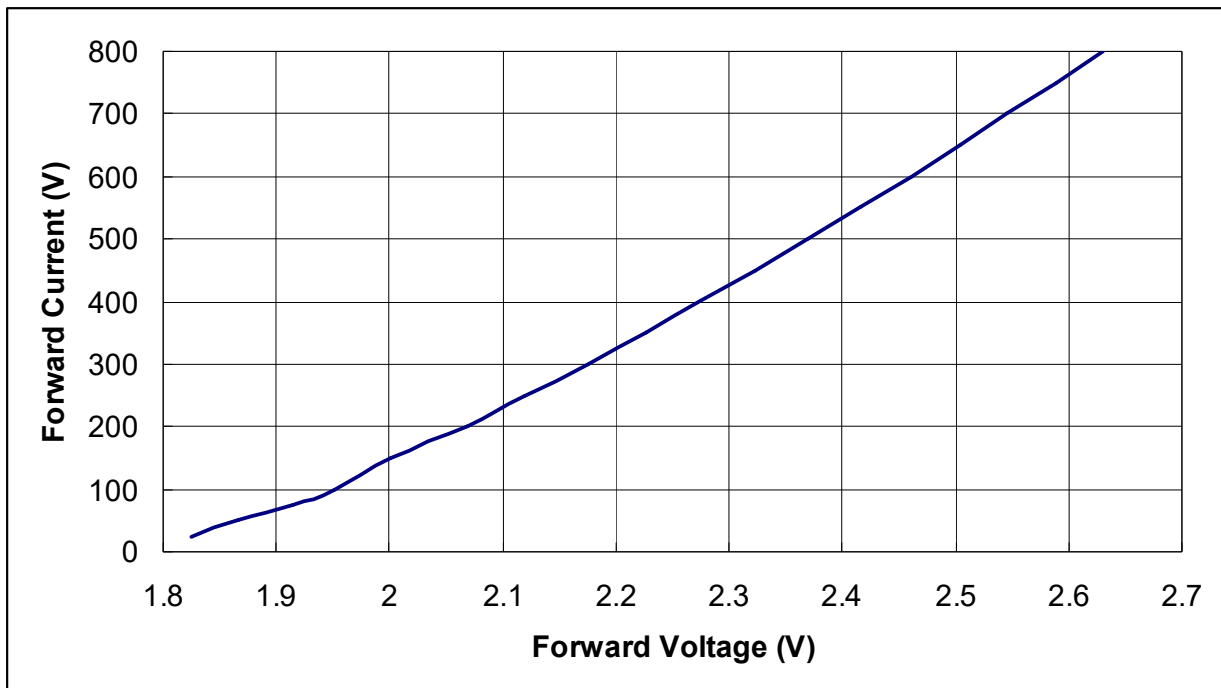


Fig. Forward Current vs. Forward Voltage: Red/Amber/Orange/Deep Red color.

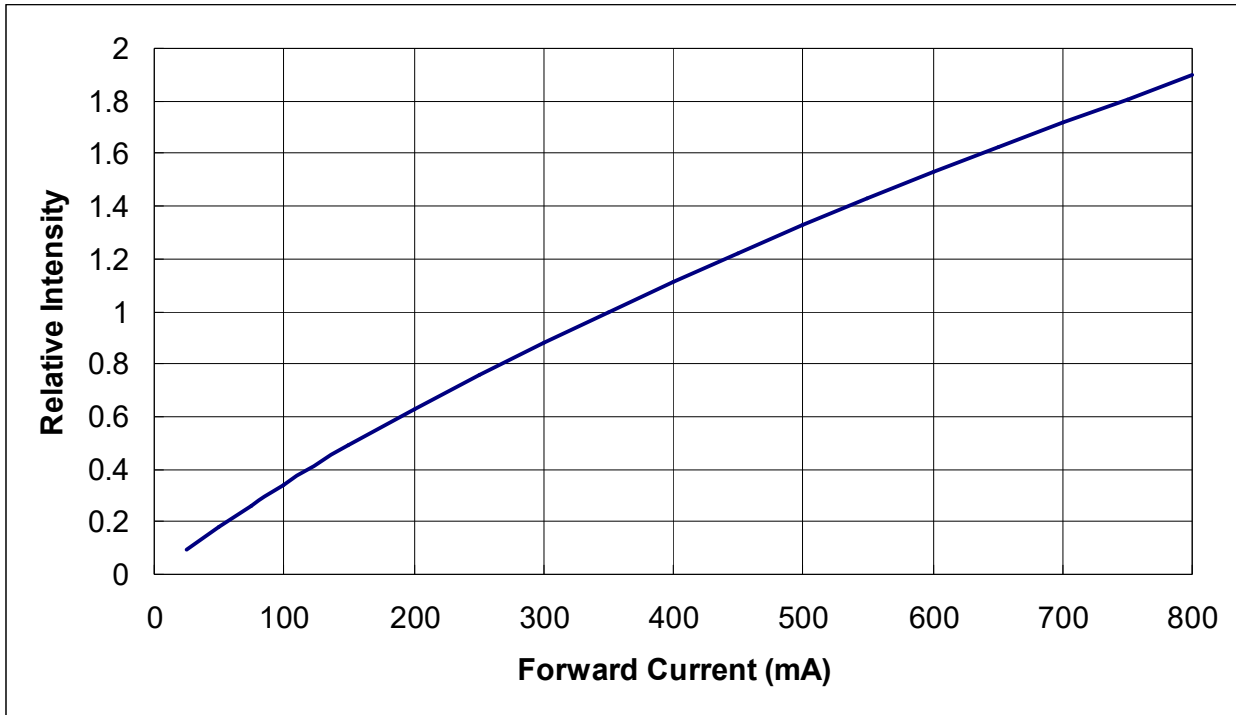


Fig. Relative Intensity vs. Forward Current: Blue/Green/Royal Blue color.

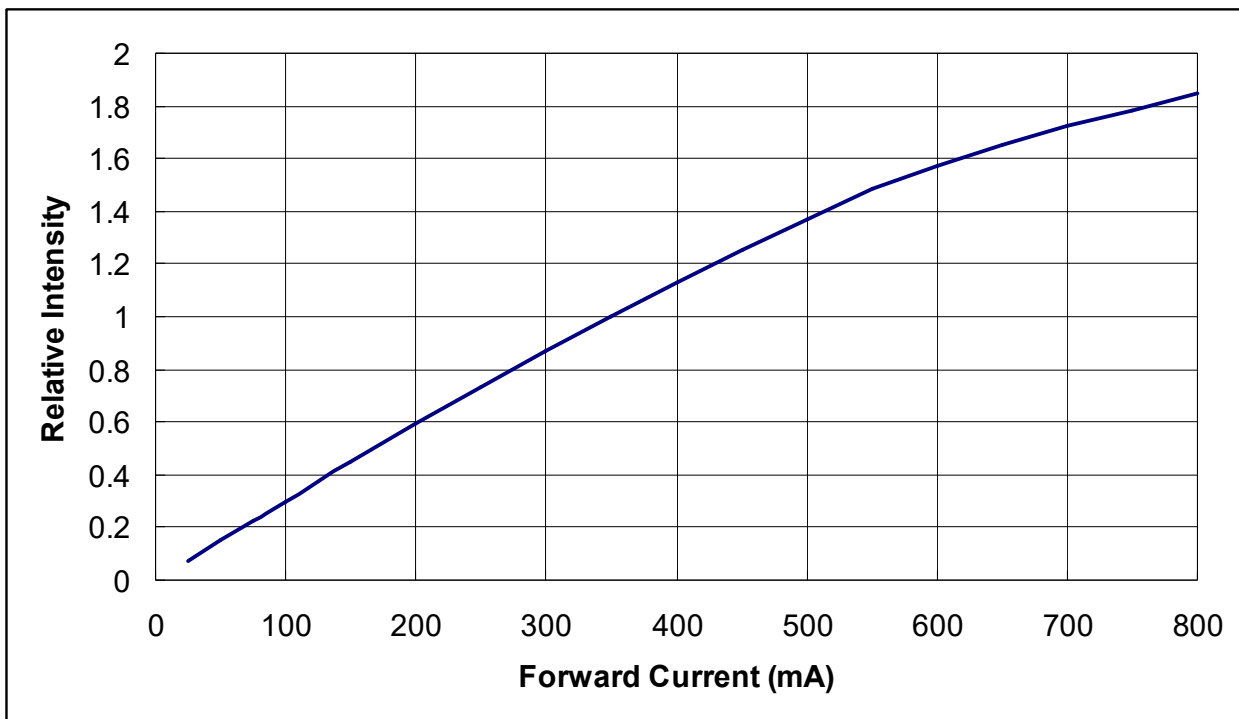


Fig. Relative Intensity vs. Forward Current: Red/Amber/Orange/Deep Red color.

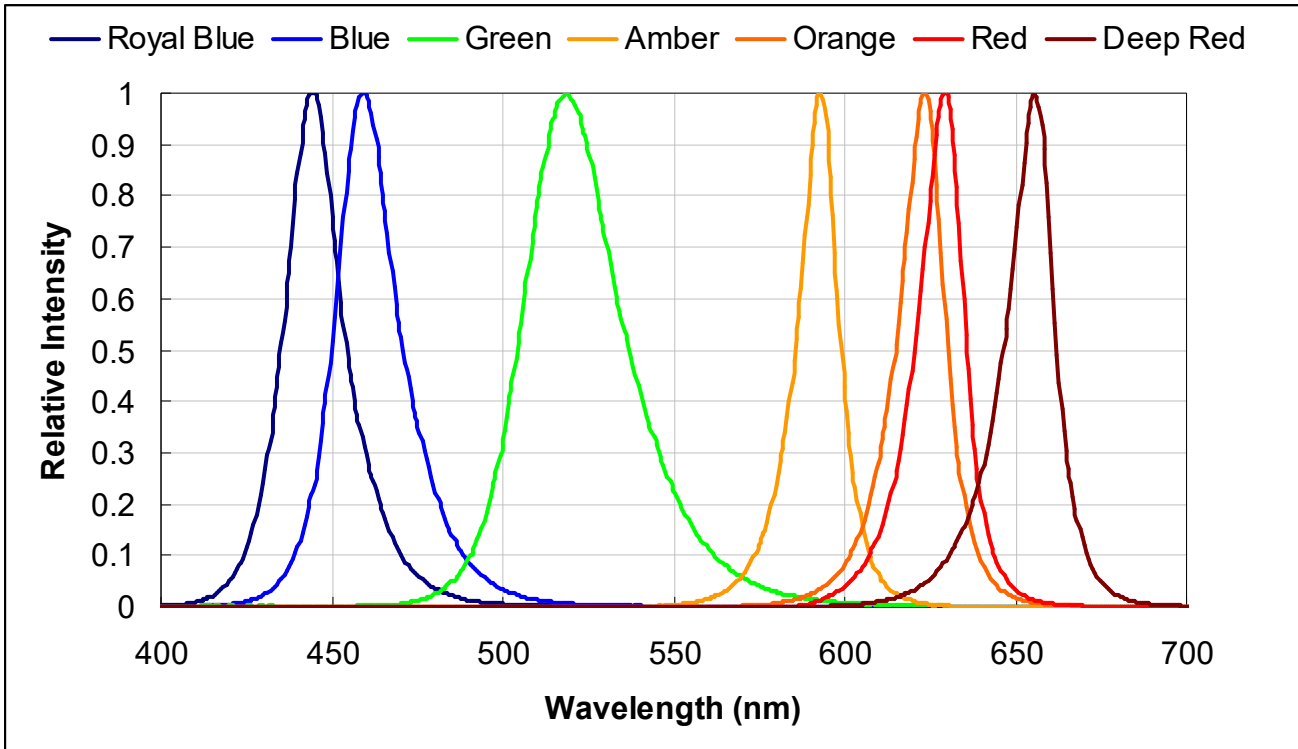


Fig. Relative Intensity vs. Wavelength.

## Outline Dimension

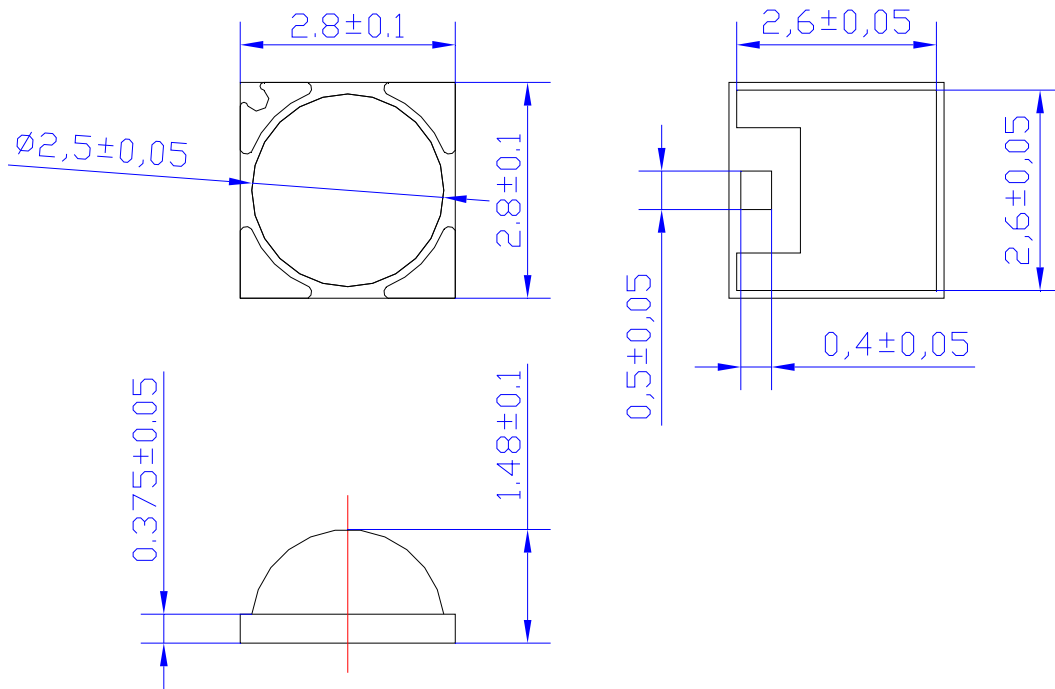
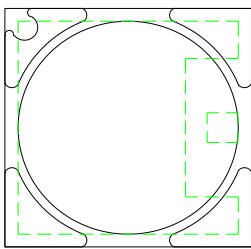
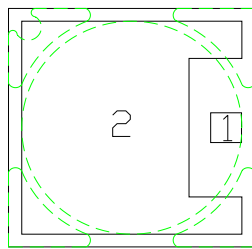


Fig. Package Outline Drawing.

### ● Pad Configuration



TOP



BOTTOM

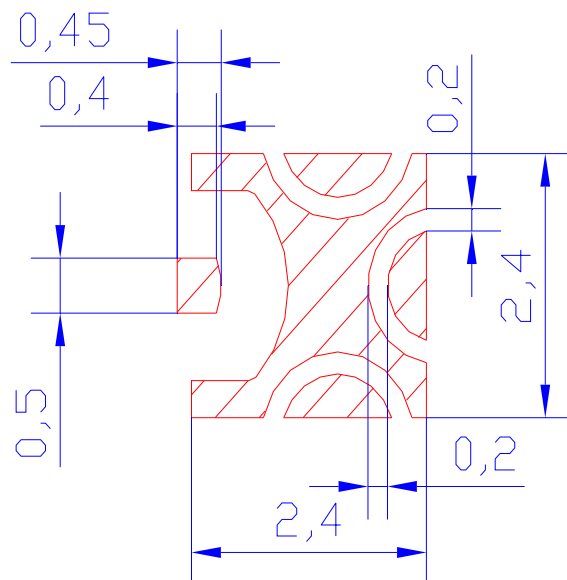
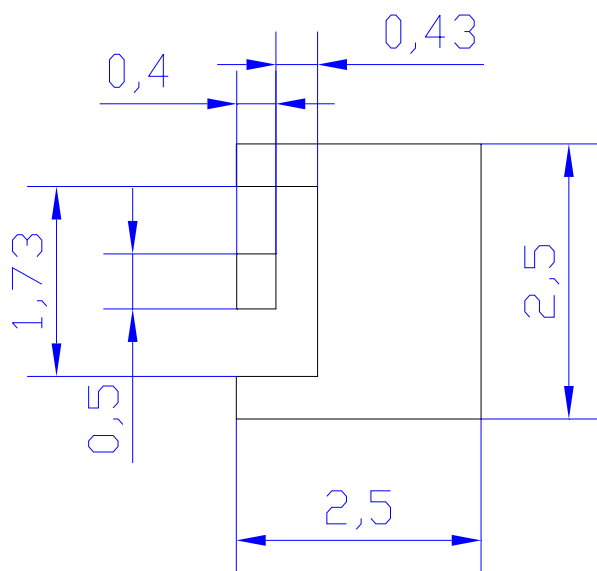
| PAD | Function      |
|-----|---------------|
| 1   | Cathode       |
| 2   | Anode、Thermal |

Fig. Pad configuration.

Note: Please don't put conductive material on the top surface of LEDs.

## Recommended Solder Pattern

Unit : mm



MCPCB LAYOUT

SOLDER MASK

Fig. Solder Pad Layout.



## Shipping Package Style

### Lens Type

#### Tapping Dimension Packaging Specification

##### 140 Degree Lens Type :

- Moisture proof bag.
- 1 Reel/bag.
- Q'ty: 2000(MAX)/Reel.

Unit : mm

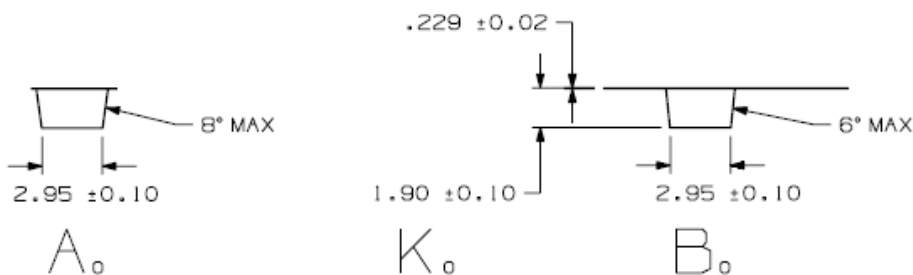
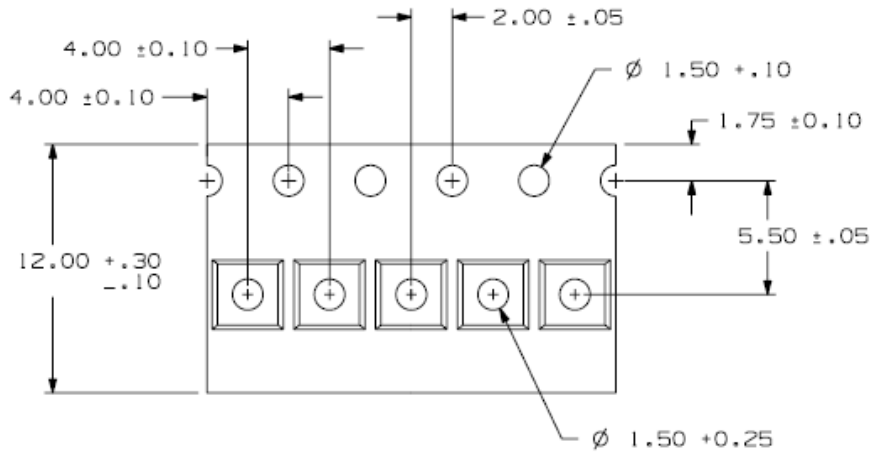


Fig. Carry Tape Drawing.

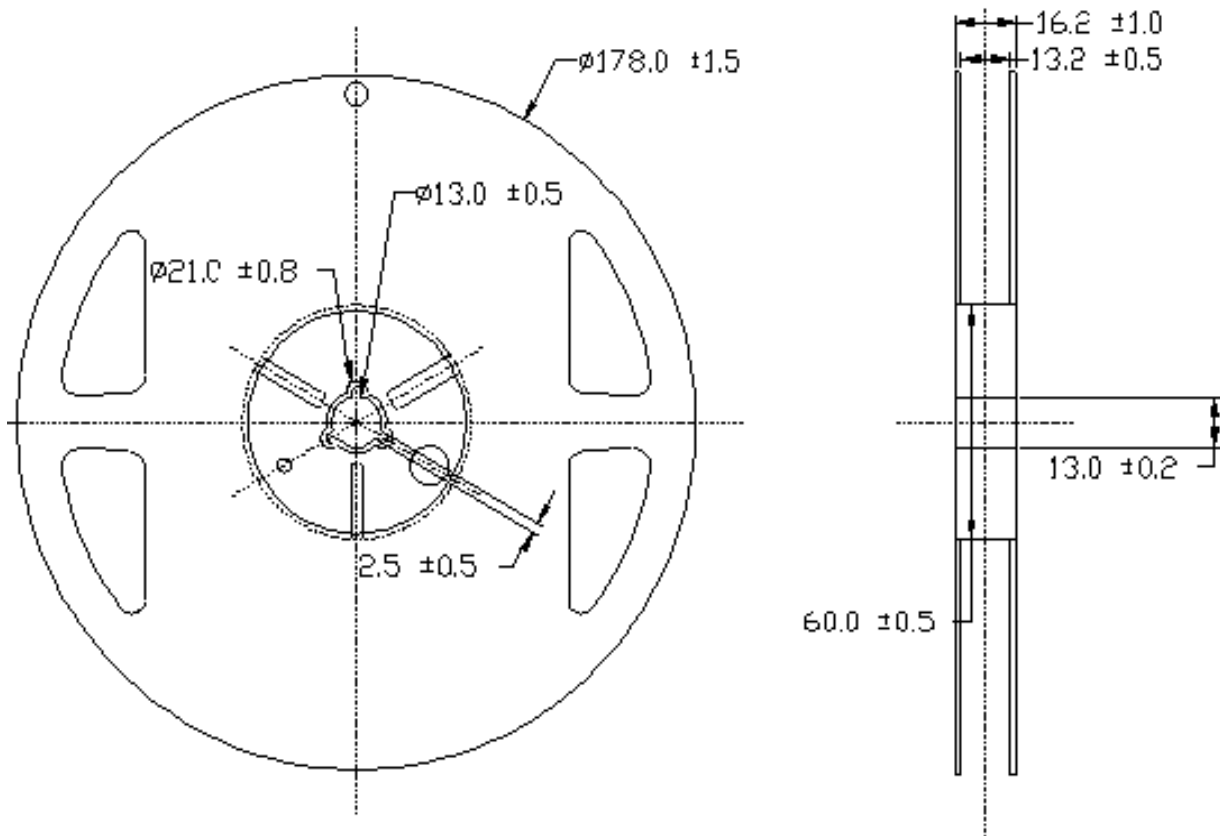
### Package

| Box Type      | Dimension (mm) | Reel/Box    | 140°Lens Type(Pcs) | Box Type      |
|---------------|----------------|-------------|--------------------|---------------|
| Small Box(S)  | 230x85x265     | 5 Reel/Box  | 10000              | Small Box(S)  |
| Middle Box(M) | 470x265x270    | 30 Reel/Box | 60000              | Middle Box(M) |
| Large Box(L)  | 470x435x270    | 50 Reel/Box | 100000             | Large Box(L)  |

### Reel Packaging :

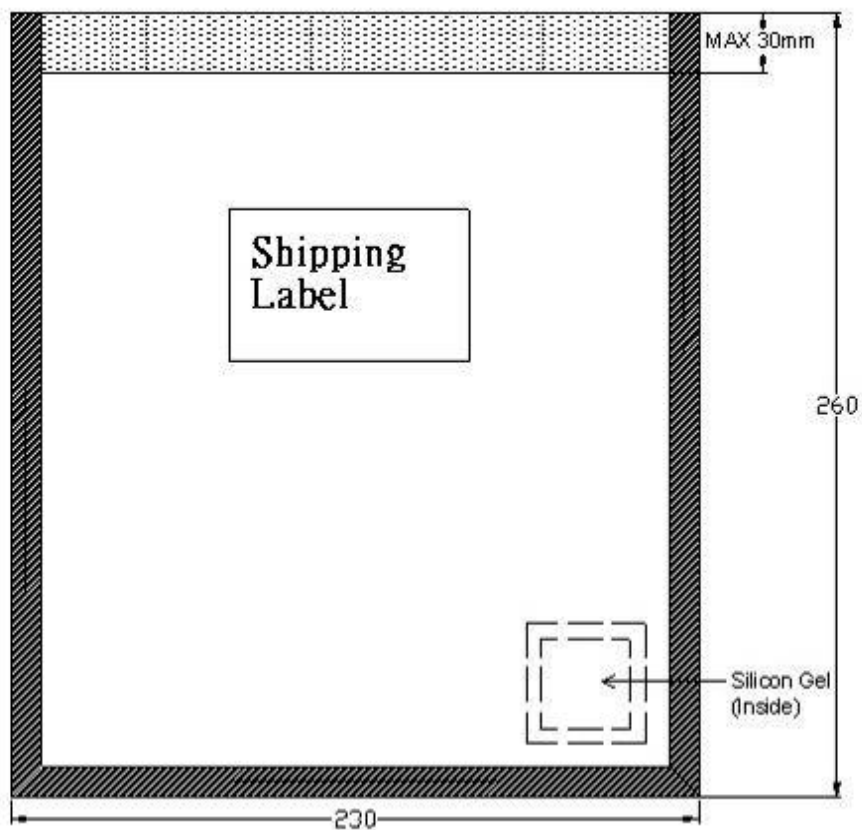
Reel Part :

Unit : mm



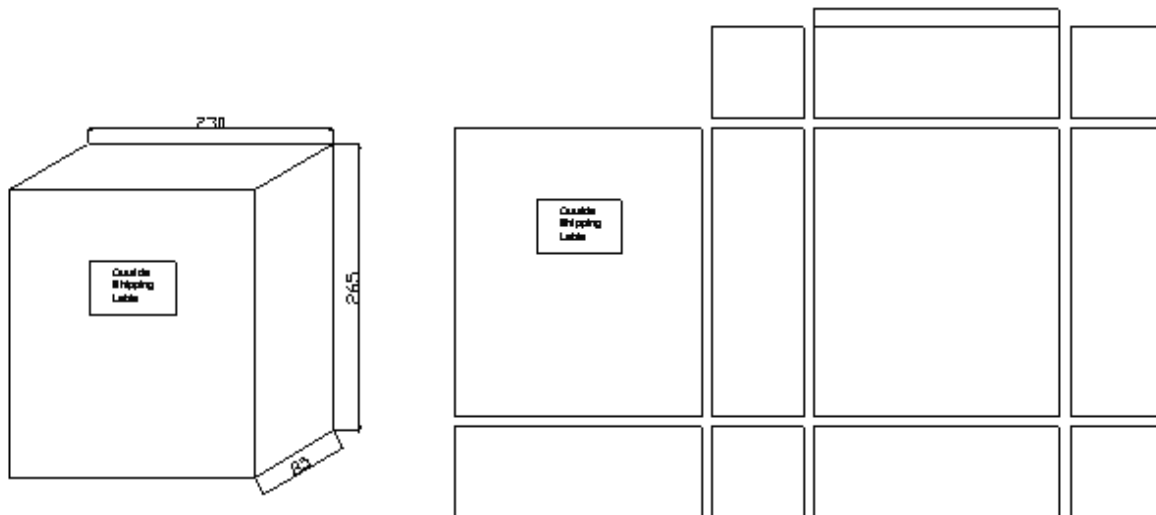
**Anti Static Bag :**

**Unit : mm**



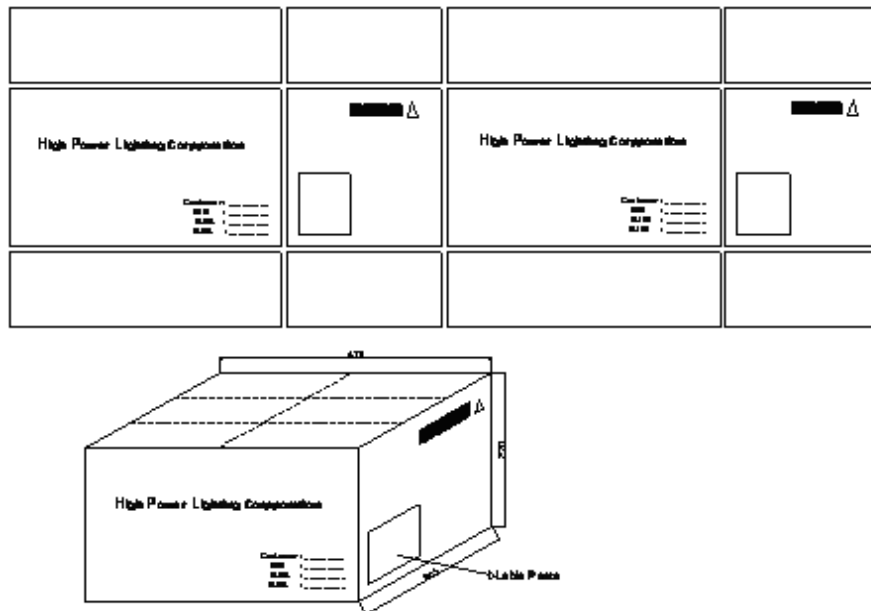
**Small Box**

Unit : mm



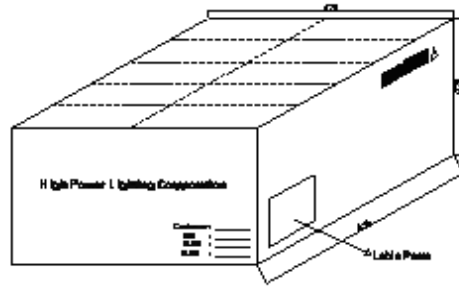
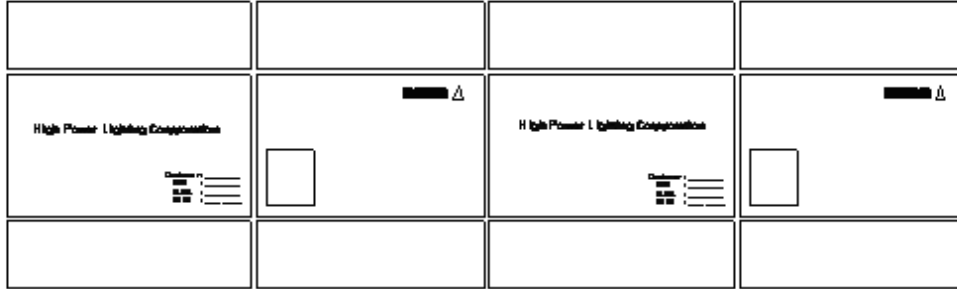
**Middle Box**

Unit : mm



Large Box

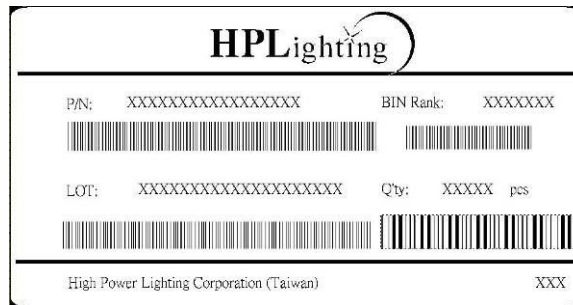
Unit : mm



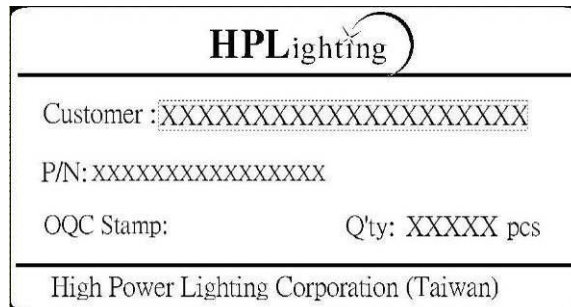
Label Formation

70mm

Unit : mm

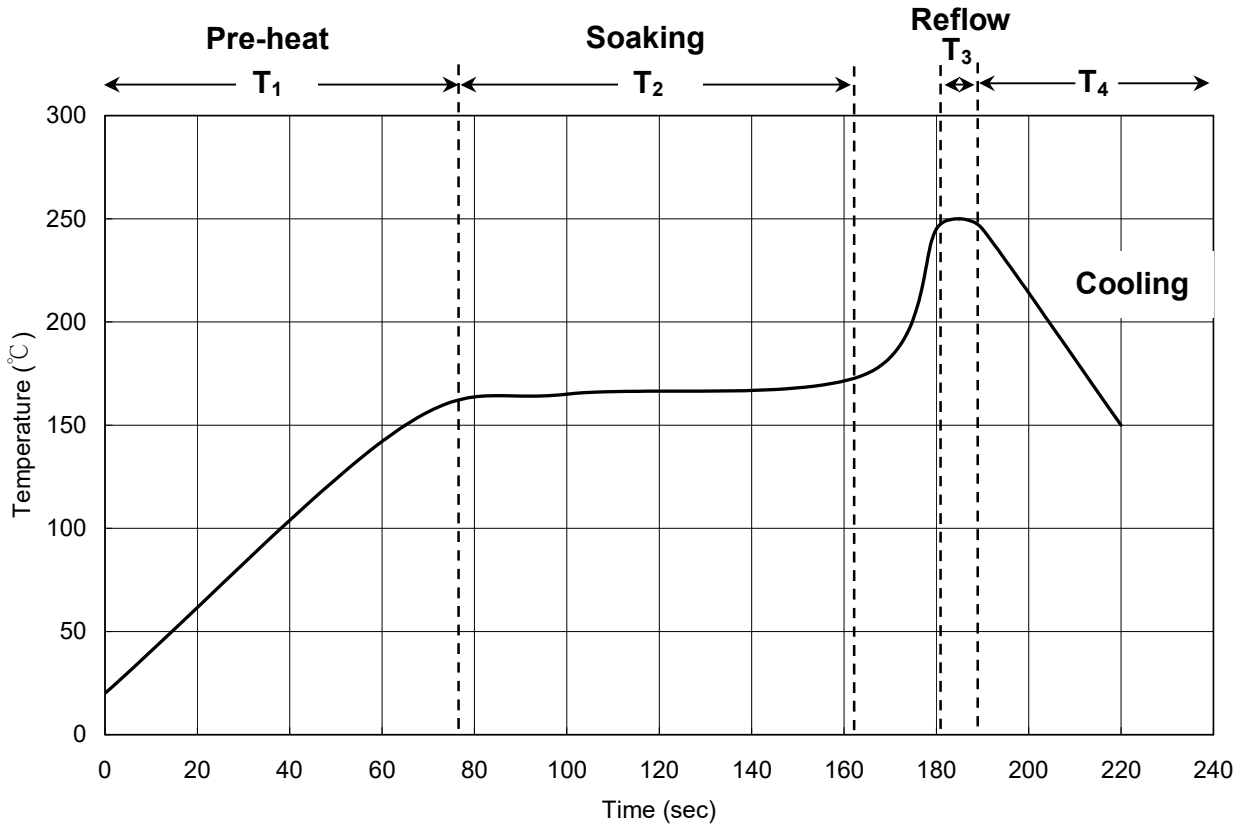


40mm



## Recommended Solder Profile

Soldering Recommended soldering conditions:



|                |                            |                   |
|----------------|----------------------------|-------------------|
| T <sub>1</sub> | Ramp up rate               | 1.0 ~ 3.0 °C /sec |
|                | Pre-heat time              | 50 ~ 80 sec       |
| T <sub>2</sub> | Soaking temperature        | 155 ~ 185 °C      |
|                | Dwell time during soaking  | 60 ~ 120 sec      |
| T <sub>3</sub> | Reflow temperature         | 240 ~ 250 °C      |
|                | Reflow time                | Max 10 sec        |
|                | Ramp up rate during reflow | 1.2 ~ 2.3 °C /sec |
| T <sub>4</sub> | Cooling                    | 1.0 ~ 6.0 °C /sec |

Note: Suggest using Sn96Ag3Cu0.5 lead free solder.

### Cleaning

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED if necessary.

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